Global Fish Oil Supply:

inputs, outputs and markets

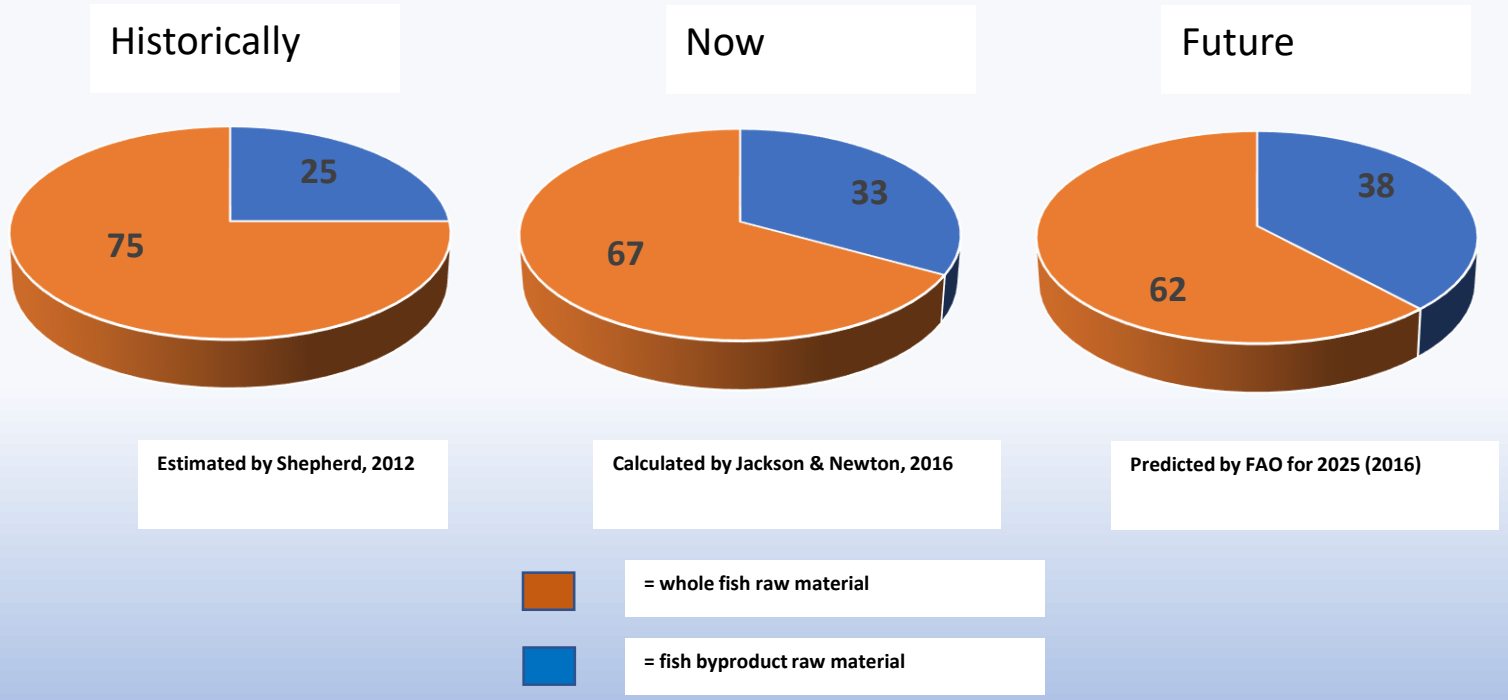
Neil Auchterlonie, IFFO

IFFO, The Marine Ingredients Organisation

www.iffo.net

- Technical support
- Lobbying
- Communications
- Market reports
- Conferences
- Standards

Inputs
Raw Material supply



More material is available

Key Points:

- **Trend for slight movement of whole fish into DHC (but byproduct goes to FMFO)**
- **Current byproduct utilisation has scope for improvement**
- **Regional differences in byproduct utilisation**
- **Issues are practical – collection & transport**
- **Aquaculture growth = more available byproduct as the sector grows**
- **Fisheries management improvements could increase the productivity of some fisheries**
- **Annual total volume 20-24 million tonnes**

Average mass balance of marine ingredients

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Whole fish/Crustaceans

Capture Fishery byproduct

Aquaculture byproduct

Raw material
(approx. 20 million tonnes per year)

5 million tonnes

14 million tonnes

1 million tonnes

Inputs
Whole fish species

INDUSTRIAL GRADE FORAGE	Landings tonnes
Gulf menhaden (*Brevoortia patronus)*	479,000
Atlantic menhaden *(Brevoortia tyrannus)*	212,000
Sand-eel (*Ammodytes spp.)*	486,500
Total 1,175,000 tonnes of which 100% converted	
FOOD GRADE FORAGE	
Peruvian anchovy (*Engraulis ringens*)	8,468,000
Japanese anchovy *(Engraulis japonicus*)	1,567,000
South African anchovy (*Engraulis encrasicolus*)	228,000
Sprat *(Sprattus sprattus)*	262,000
Blue whiting (Micromesistius poutassou)	678,500
Capelin *(Mallotus villosus*)	958,500
Total 12,162,000 tonnes of which an estimated 90% was converted	
PRIME FOOD FISH	
Atlantic herring (*Clupea harengus)*	656,500
European sardine *(Sardina pilchardus)*	639,000
Chilean jack mackerel (*Trachurus murphyii*)	1,870,000
Japanese jack mackerel *(Trachurus japonicas)*	320,000
Chub mackerel *(Scomber japonicus)*	1,403,500
Californian sardine (*Sardina sagax caerulea*)	556,000
South African sardine (*Sardina sagax)*	263,000
Total 5,708,000 tonnes (average landings 2001 – 2006) of which an unknown percentage was converted	

Source: Wijkström, 2011

Inputs
Byproduct

- Some differences from whole fish fishmeals: higher bone proportion (ash content)
- Lower muscle proportion
- Often higher/variable oil yield
- Byproduct meals often produced from very fresh raw material, especially aquaculture byproduct
- Some of these meals finding unique markets

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Outputs
Estimates of oil proportions

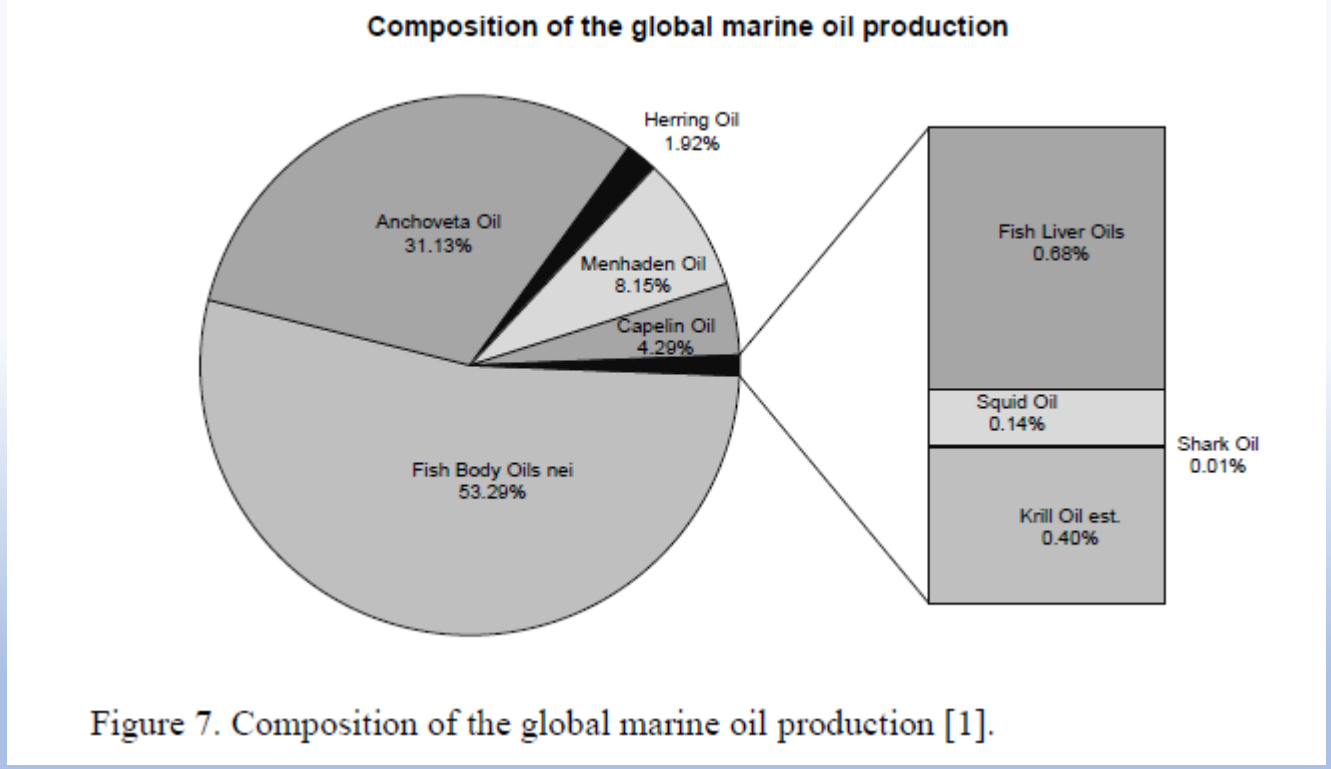


Figure 7. Composition of the global marine oil production [1].

Source: Bimbo, 2015

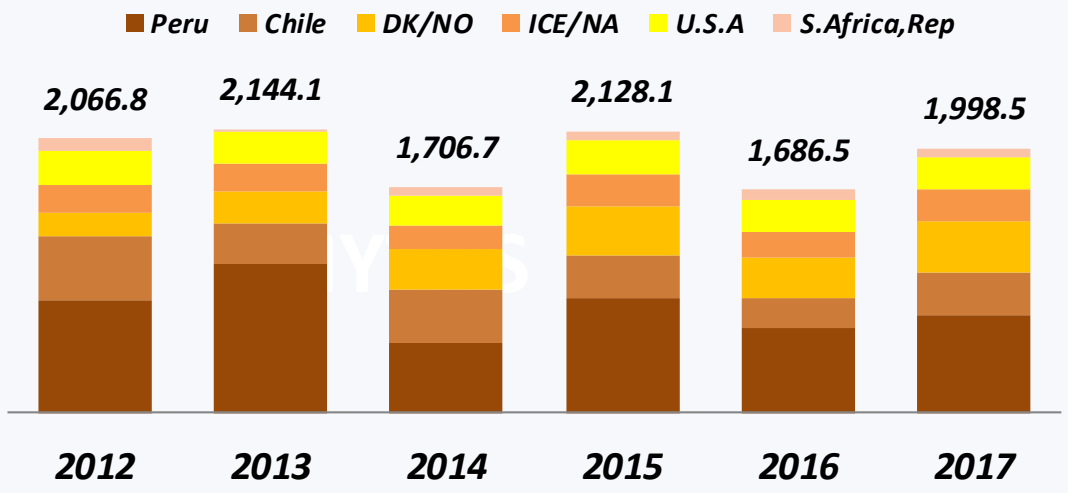
SUPPLY in 2017

Year 2017: Total IFFO countries' production

"IFFO Countries" used as a proxy for global production.

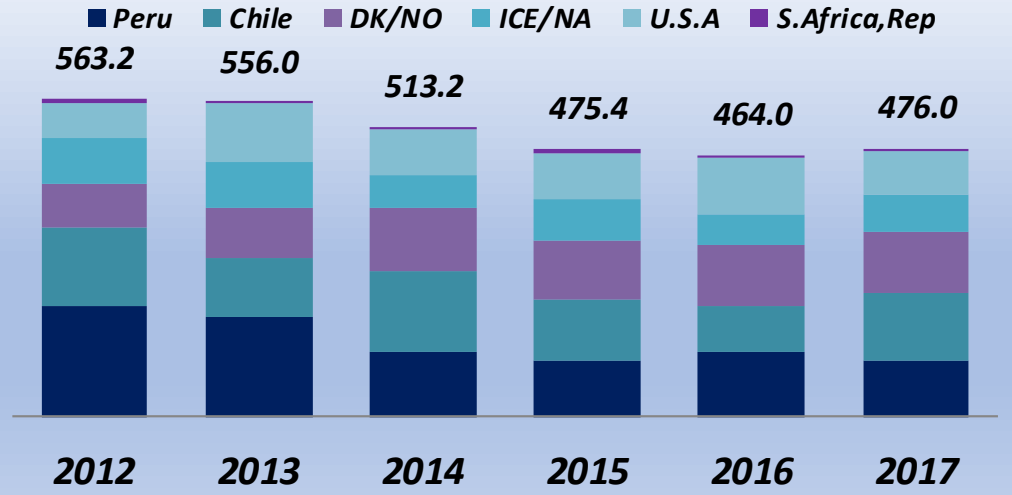
Strong correlation over time

Fishmeal (000 mt)



DK = Denmark
NO = Norway
ICE = Iceland
NA = North Atlantic (UK, EIRE, Faroe Islands)
USA = Menhaden and Alaskan fisheries
SA = South Africa

Fish oil (000 mt)



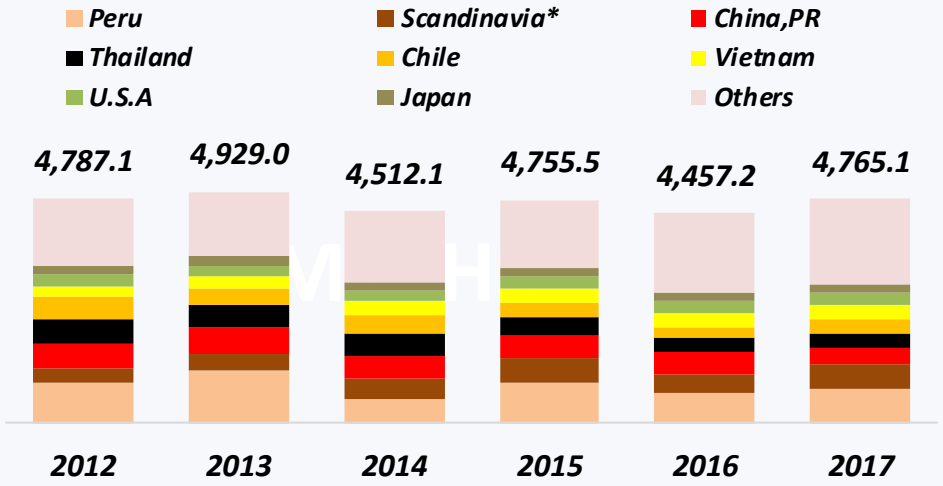
Outputs: Year 2017: World's production

The overall global supply of fishmeal and fish oil in 2017 rebounded with respect to the previous year.

Fishmeal overall supply climbed to the largest tonnage since 2013.

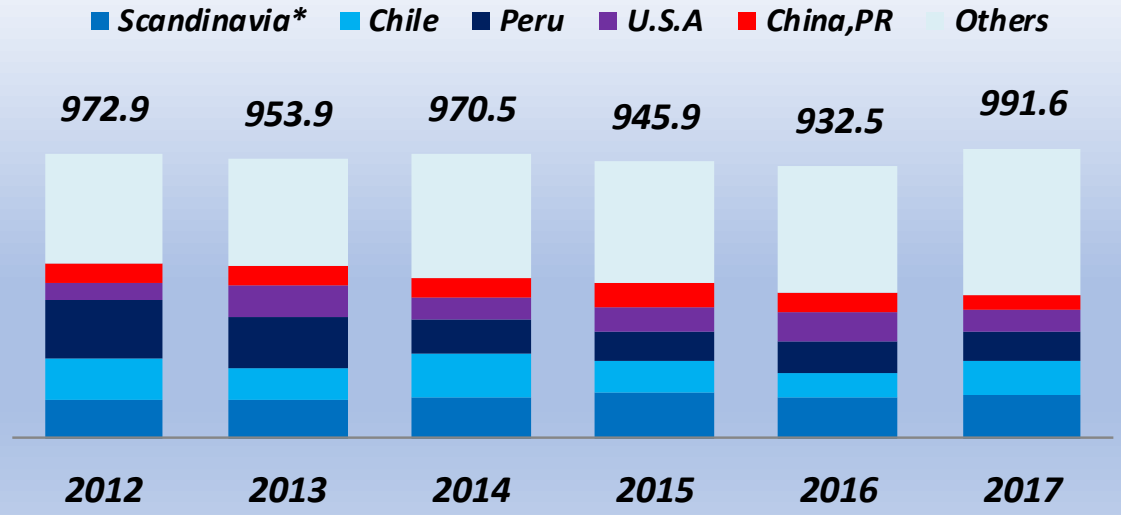
As for fish oil, we need to go back to the year 2011 to find a bigger output at 1.127 million mt.

Fishmeal world ('000 mt)



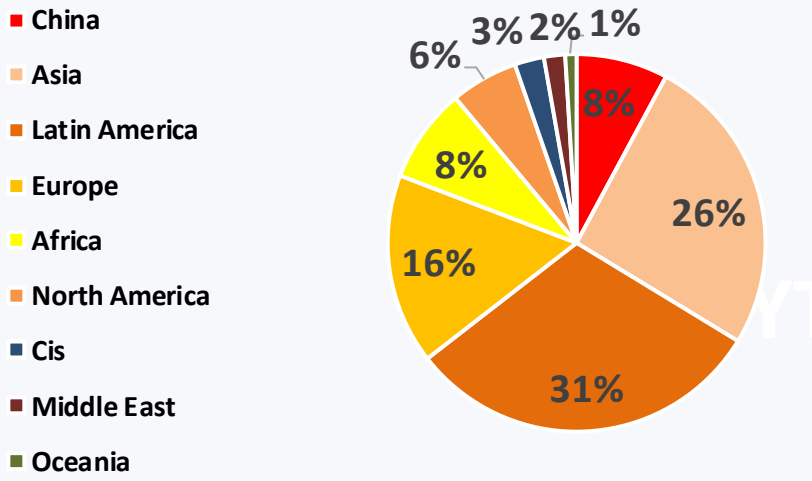
* Scandinavia = Denmark, Iceland and Norway

Fish oil world ('000 mt)

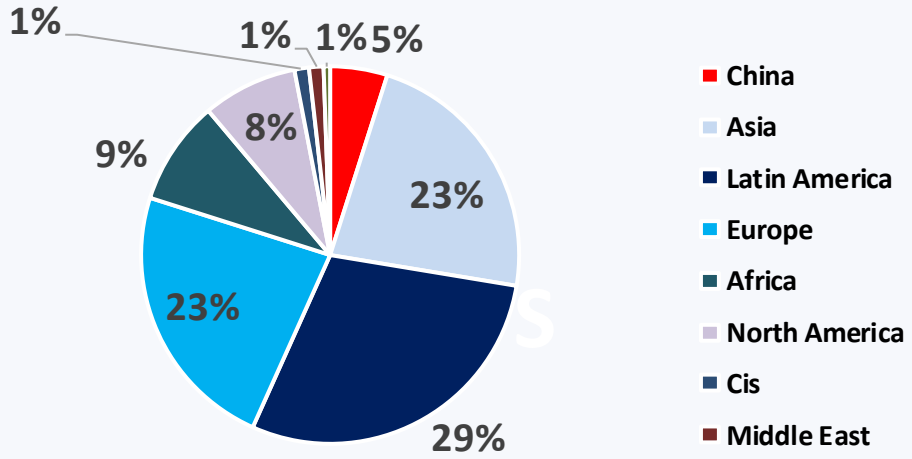


Year 2017: World's production

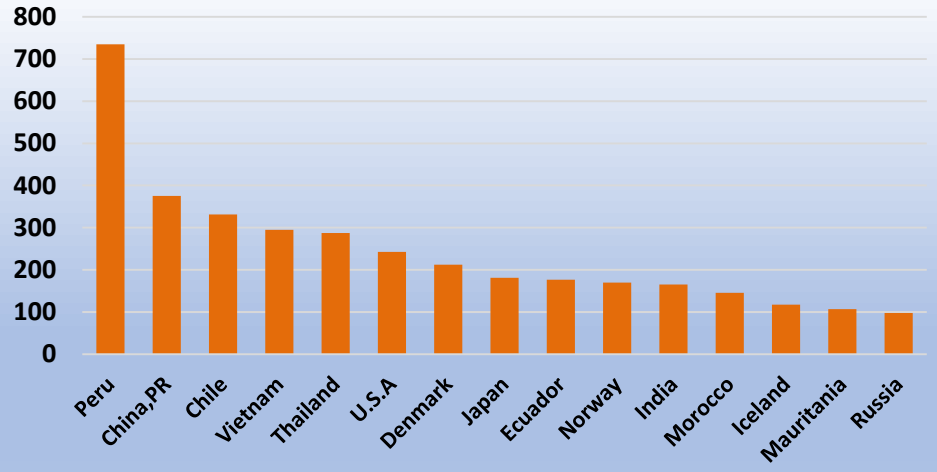
2017 geographical breakdown: fishmeal



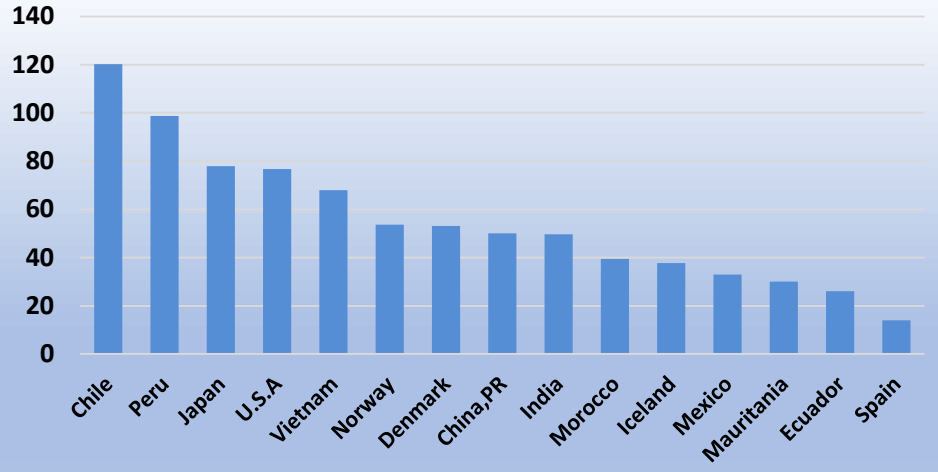
2017 geographical breakdown: fish oil



2017 top 15 countries: fishmeal (000 mt)



2017 top 15 countries: fish oil (000 mt)



SUPPLY in 2018

Trends 2018

FMFO production in first 3 Qs well above average of previous decade

Quotas slightly up; FM production slightly up; FO up more significantly - variance in yield

FM slightly down; FO down – lower yields; 2018 overall expected lower than 2017

US FM up; FO up; RSA FM flat, FO down

Outputs 2018: Expected world's production

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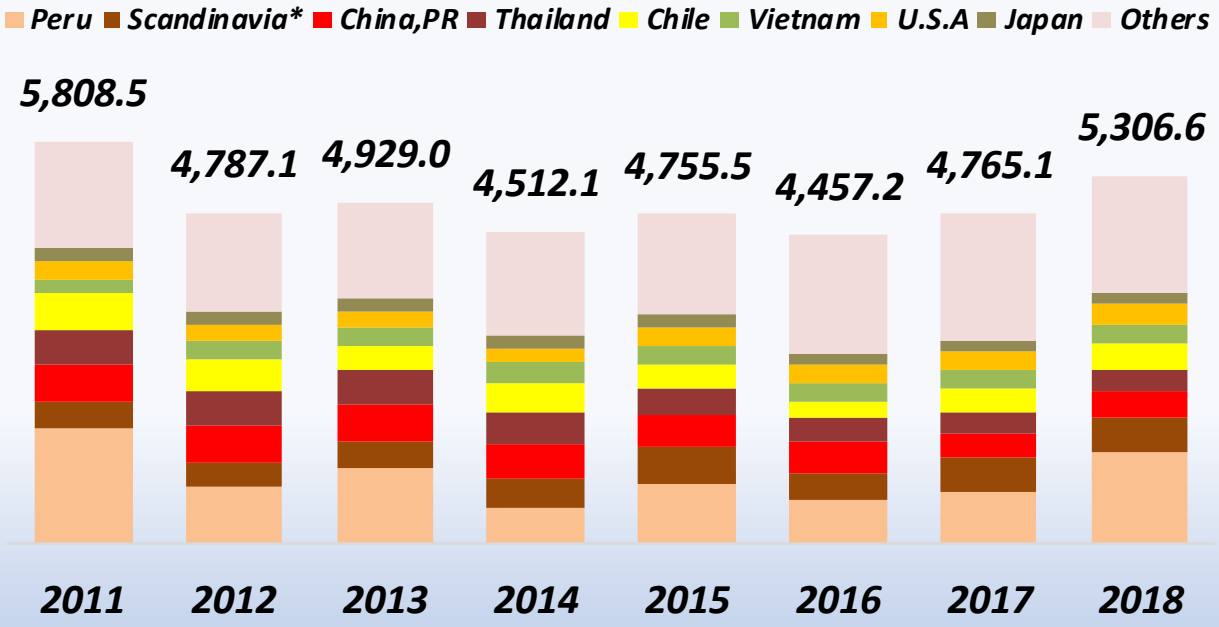
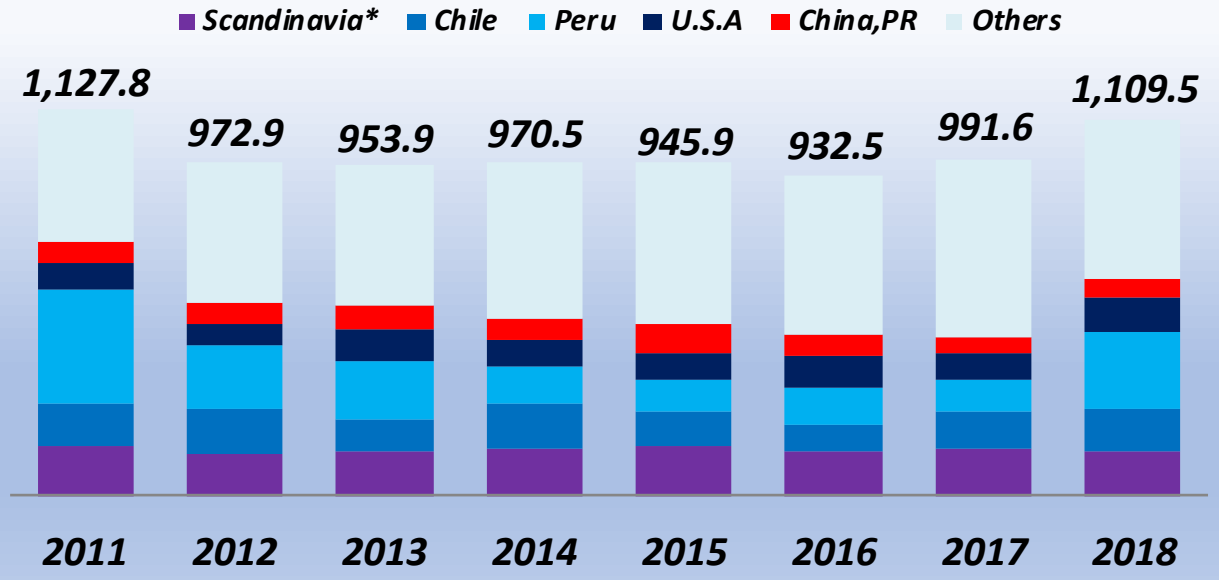
Fishmeal ('000 mt)



Whatever scenario we would consider for Peru we expect the year 2018 to produce around 5.3 million mt of fishmeal and 1.1 million mt of fish oil. This would lead to the best performance since the year 2011 for both meal and oil.

In these graphs we assume a mid-point ***scenario in Peru*** *(1,500,000 mt of raw material used in quarter IV 2018, around 350,000 mt of fishmeal and around 68,000 mt of oil).*

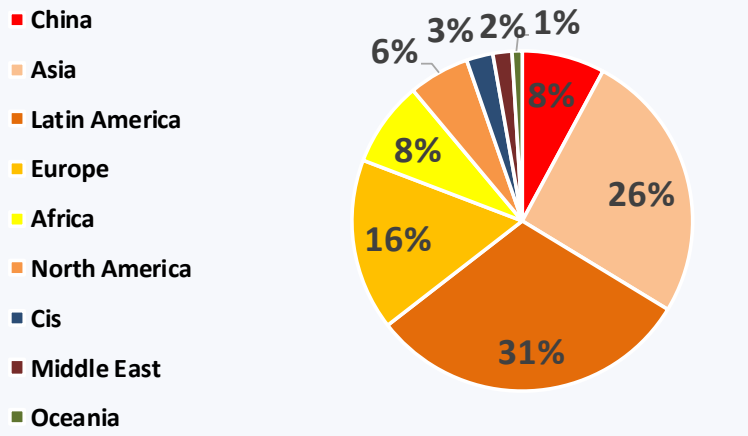
Fish oil ('000 mt)



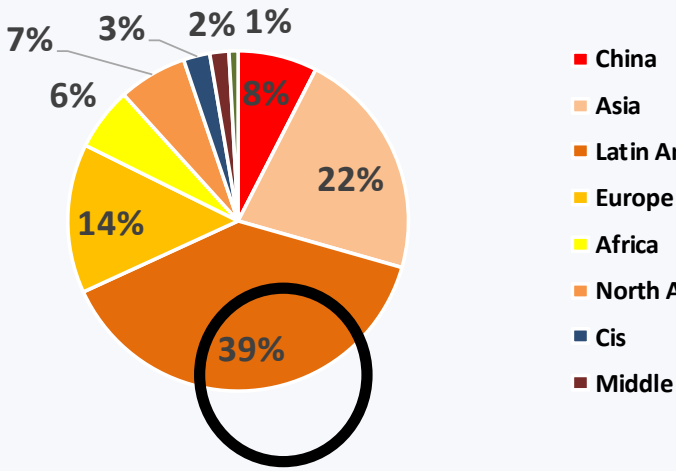
** Scandinavia = Denmark, Iceland and Norway*

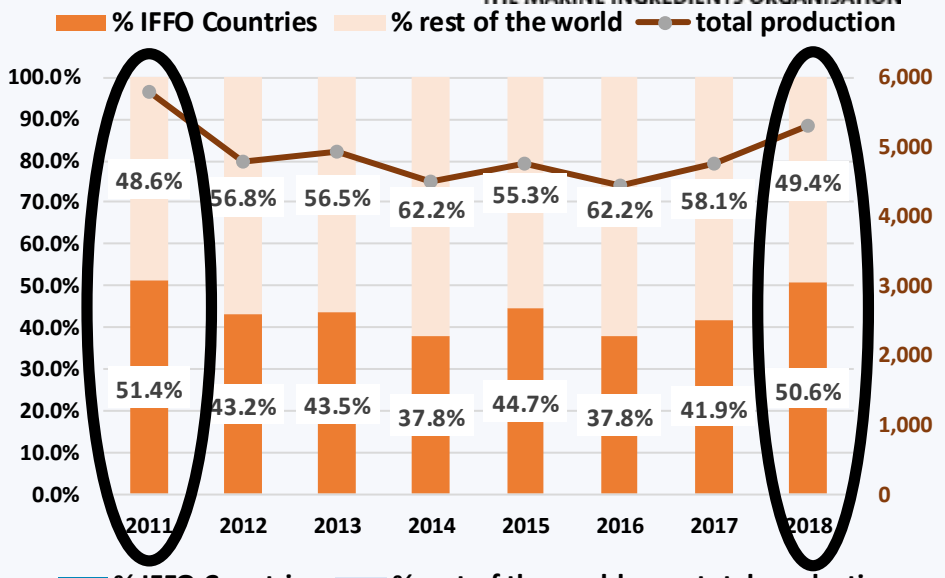
Year 2017 vs Year 2018: World's production

2017 geographical breakdown: fishmeal

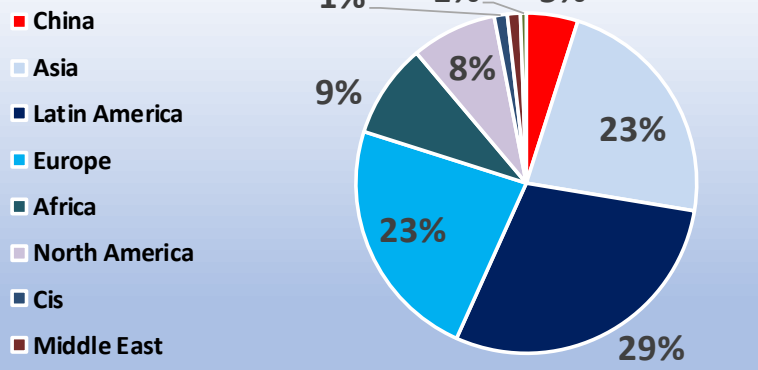


2018 geographical breakdown: fishmeal

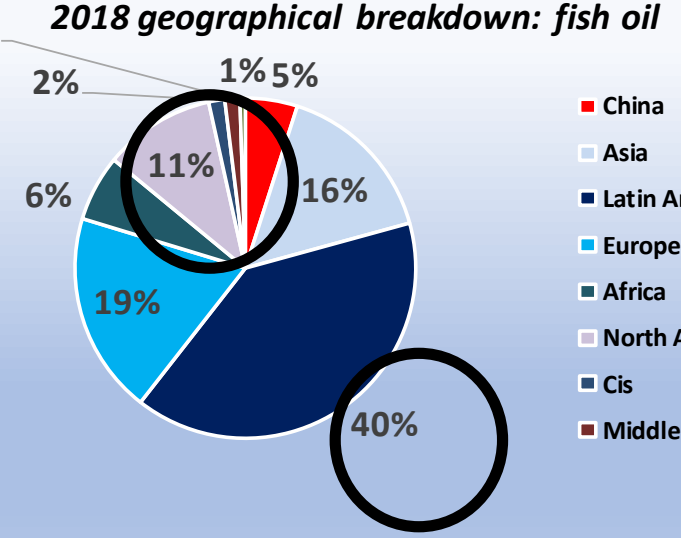


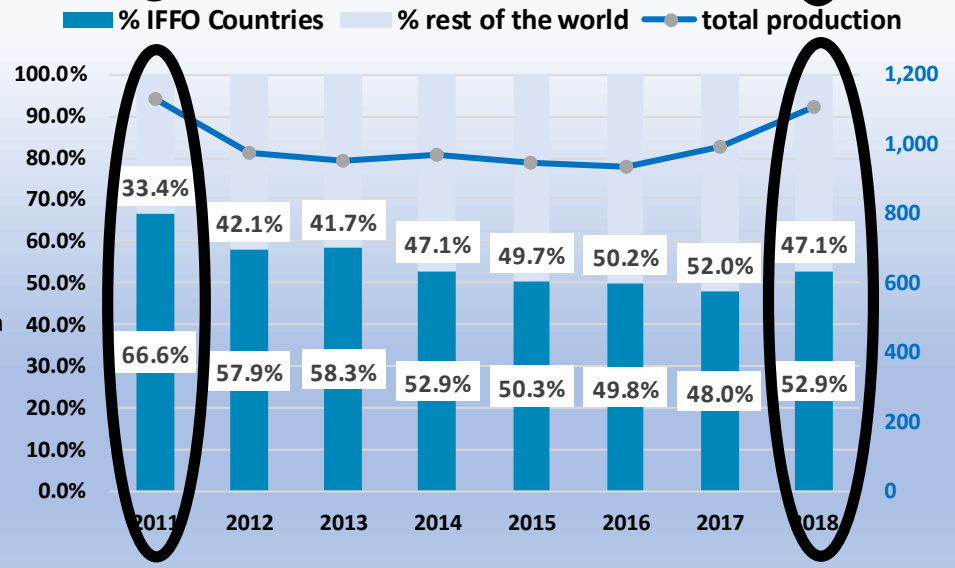


2017 geographical breakdown: fish oil



2018 geographical breakdown: fish oil





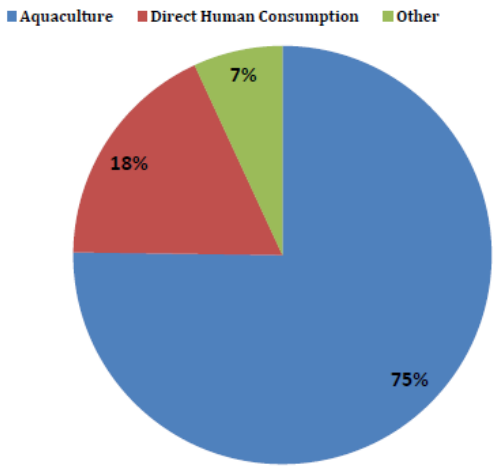
SUPPLY in 2019

Outputs 2019

- Factors:
  - Possible weak El Niño along Peruvian coast December 2018 – March 2019;
  - ICES recommendations for TACs in Europe are showing a decrease for several species and available raw material in Europe could be down significantly;
  - Some important countries (e.g. in Africa, Asia) expecting a rebound in production – this could offset any reduction in supply from Peru and Europe;
- Overall 2019 looking to be similar to 2018.

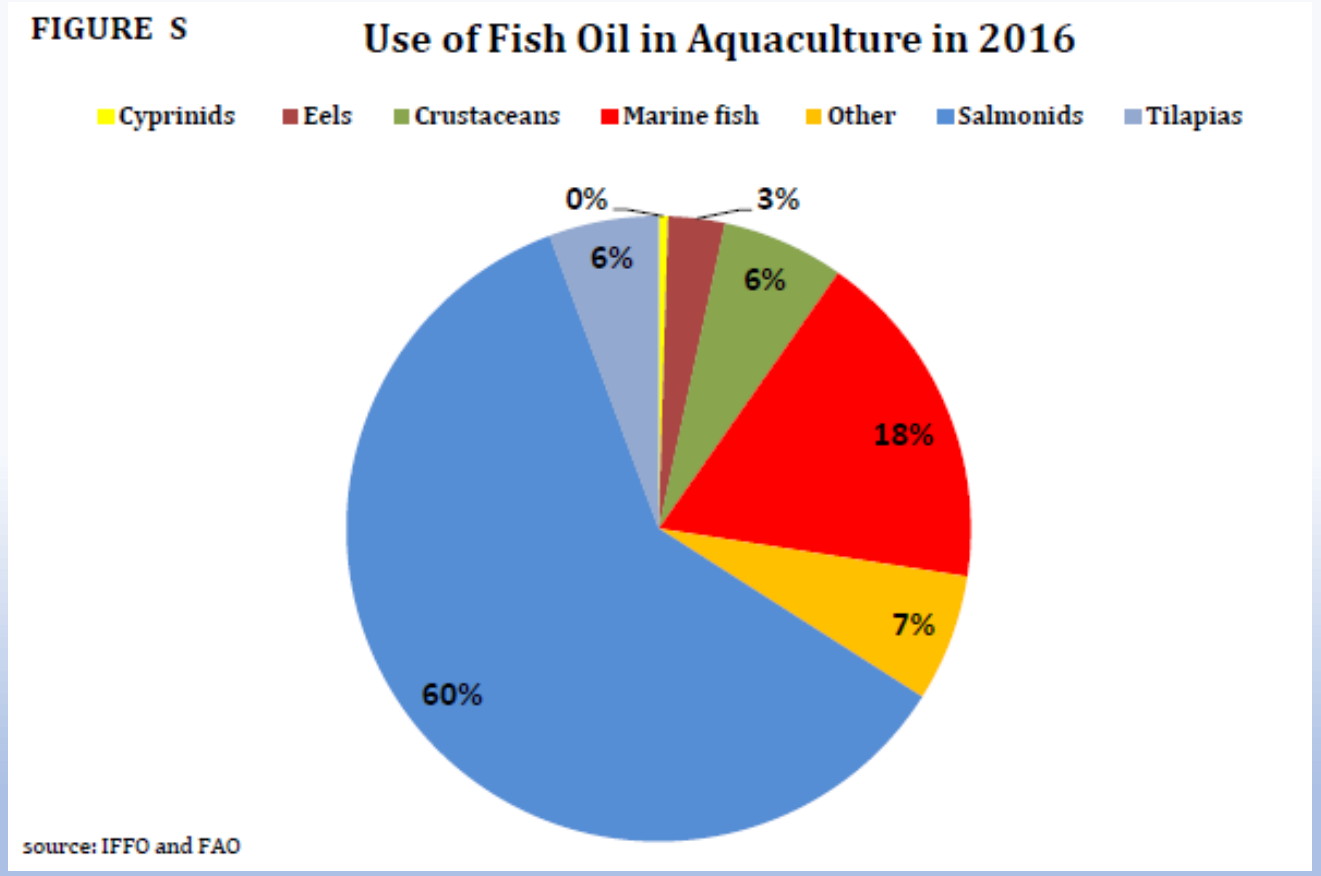
Markets

FIGURE T



source: IFFO and FAO

FIGURE S



source: IFFO and FAO

Some relevant IFFO Projects

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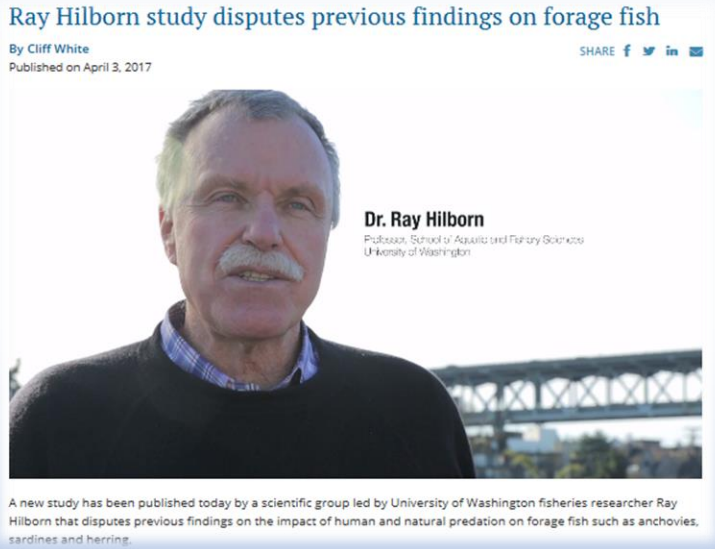
Science & Sustainability: Management of forage fish stocks

Lenfest Report (Little Fish; Big Impact):

- Published 2012;
- Funded by Pew;
- Precautionary in nature;
- Series of recommendations for low trophic level fishery management, based on level of information;
- Adopted ecosystem modelling techniques from the terrestrial environment;
- Questions over relevance to marine ecosystem, and especially predator-prey interactions.


Ray Hilborn study disputes previous findings on forage fish

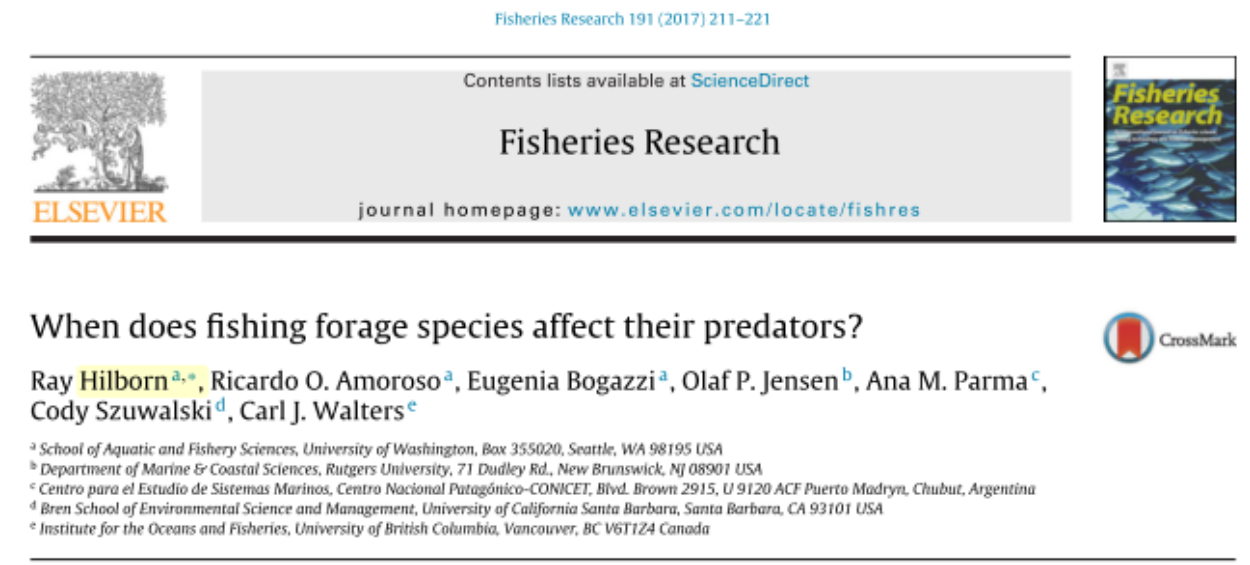
By Cliff White
Published on April 3, 2017

SHARE

Dr. Ray Hilborn
Professor, School of Aquatic and Fishery Sciences
University of Washington

A new study has been published today by a scientific group led by University of Washington fisheries researcher Ray Hilborn that disputes previous findings on the impact of human and natural predation on forage fish such as anchovies, sardines and herring.

Science develops over time:



Fisheries Research 191 (2017) 211–221

Contents lists available at ScienceDirect

Fisheries Research

journal homepage: www.elsevier.com/locate/fishres

When does fishing forage species affect their predators?

Ray Hilborn[a,*], Ricardo O. Amoroso[a], Eugenia Bogazzi[a], Olaf P. Jensen[b], Ana M. Parma[c], Cody Szuwalski[d], Carl J. Walters[e]

[a] School of Aquatic and Fishery Sciences, University of Washington, Box 355020, Seattle, WA 98195 USA
[b] Department of Marine & Coastal Sciences, Rutgers University, 71 Dudley Rd., New Brunswick, NJ 08901 USA
[c] Centro para el Estudio de Sistemas Marinos, Centro Nacional Patagónico-CONICET, Blvd. Brown 2915, U 9120 ACF Puerto Madryn, Chubut, Argentina
[d] Bren School of Environmental Science and Management, University of California Santa Barbara, Santa Barbara, CA 93101 USA
[e] Institute for the Oceans and Fisheries, University of British Columbia, Vancouver, BC V6T1Z4 Canada

This is the developing evidence-base that will help support change in fisheries management

But…..

There is a lag time between science publication, and achieving changes in approach to regulation…….

"We show that existing analyses using trophic models have generally ignored a number of important factors including:

- *(1) the high level of natural variability of forage fish,*
- *(2) the weak relationship between forage fish spawning stock size and recruitment and the role of environmental productivity regimes,*
- *(3) the size distribution of forage fish, their predators and subsequent size selective predation*
- *(4) the changes in spatial distribution of the forage fish as it influences the reproductive success of predators"*

IFFO & GAA: Driving change in South East Asian trawl fisheries, fishmeal supply, and aquafeed

IFFO & GAA: Driving change in South East Asian trawl fisheries, fishmeal supply, and aquafeed

Background:

Information is generally lacking about South East Asian fisheries in terms of their biology, fishing practices, and environmental impact, as well as their contributions for social (employment, food security implications, etc.), or economic (value, trade dynamics, etc.) factors. Some social and fisheries management issues are well known and attract criticism right across the fisheries, fishmeal, fish feed, aquaculture, seafood and retail sectors, both in SEA and beyond where some of the markets for the regional products extend. It is challenging to assess long-term viability, yet these fisheries are of key importance to direct and indirect food security in the region and globally, and represent a regional societal vulnerability. What is needed urgently is an understanding of these fisheries from the

In This Section

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Research reveals huge potential in increasing food production, value and sustainability in the Scottish salmon industry through strategic use of by-products

Wednesday, February 14, 2018

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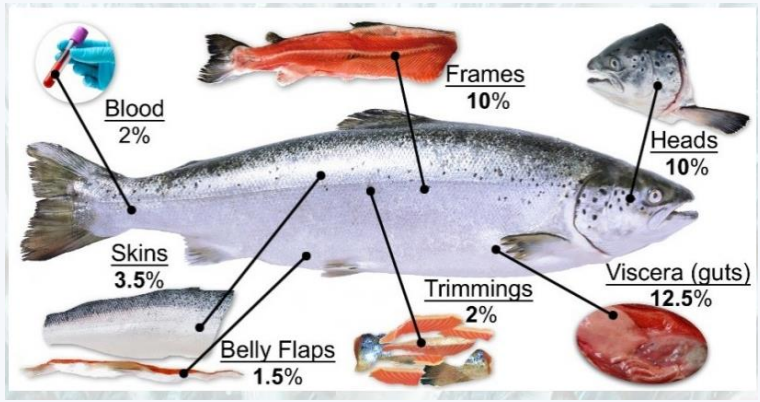

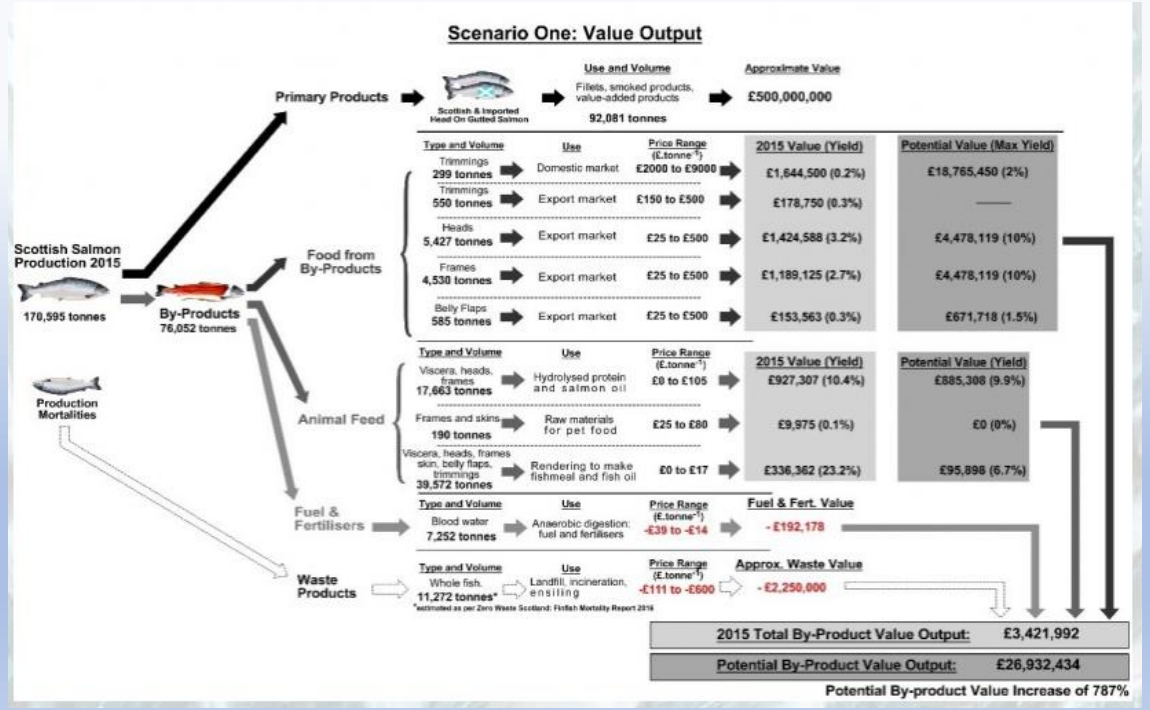

Stevens et al., 2018
https://doi.org/10.1016/j.marpol.2017.12.027

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Sociedad Nacional de Pesquería

Peruvian Anchovy

Why feed, not food?

CT SHEET

Overview

Peruvian anchovy has some of the highest concentrations of EPA and DHA polyunsaturated fatty acids of any fish species. Although eaten as whole fish, the majority of Peruvian anchovy are turned into fish oil for feed and capsules, as well as fishmeal, mainly used in aquafeeds. The comparatively low rate of direct human consumption has led some to accuse the industry and the Peruvian Government of depriving local communities of a valuable food source. However, although much effort is, and has been, devoted to promoting the consumption of anchovy in fresh, canned and frozen state, that market remains very small.

The main points are:

- Peru's fishery also has other more appealing species such as mackerel, horse mackerel and bonito, which are species that are just as affordable, much more palatable, and more versatile from a culinary point of view. Peruvian households prefer these species instead of anchovy.
- Anchovy are fragile fish that deteriorate quickly, limiting storage and transport options for the food market.
- Both industry and government have invested millions since the 1960s to increase direct human consumption of this resource, but the projects have had a limited impact despite the effort and money spent.
- Their distinct, strong flavour makes them relatively unpalatable; therefore, despite their promotion, they tend to be eaten in small quantities. According to anthropologists that have been consulted, it is more difficult to change people's eating habits than it is to change their religion.
- Using fishmeal and fish oil strategically in aquatic and animal diets produces many more volumes of more widely accepted and consumed fish and other animal protein in a more efficient

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